RCA TECHNICAL NOTES

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RADIATION SENSITIVE DEVICE FOR VIEWING LOW INTENSITY HEAT IMAGES

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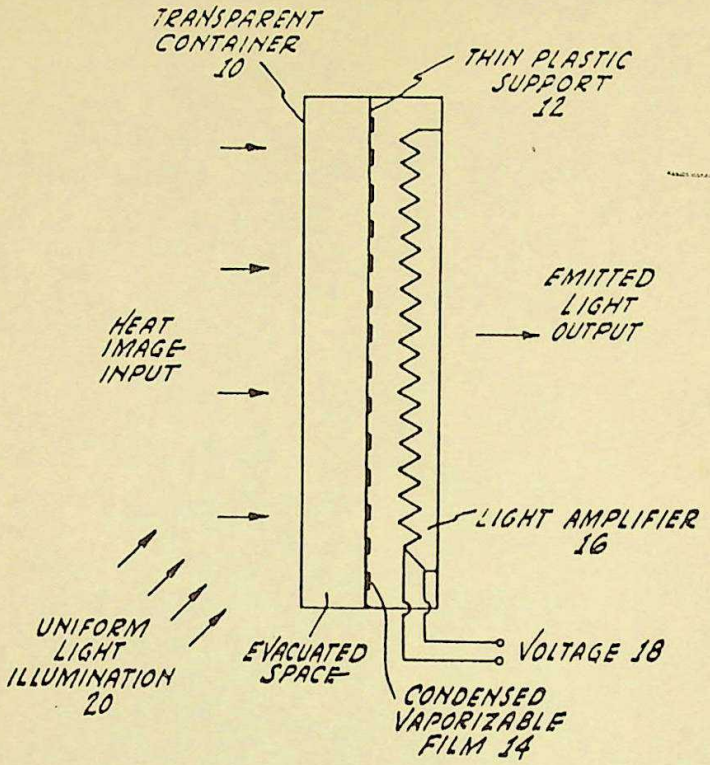

This is a highly sensitive device for viewing low intensity heat images. The device makes use of a sensitive property of a photoconductor along with the evaporagraph principle of operation.

A practical embodiment is illustrated as comprising a container 10, such as lucite, which is transparent on both input and output faces. Within the container there is a very thin plastic support sheet 12 carrying on one side a film of condensed vapor 14. The support sheet has a thickness less than .001" and is stretched on a diaphragm. The condensed vapor material may be iodine, bromine, oil, or water vapor. The space between the input face of the device and the thin plastic support sheet is evacuated. In close proximity to the film of condensed vapor 14 there is provided a conventional grooved photoconductor type of light amplifier 16 having a photoconductor exposed toward the vapor film.

In the operation of the device, the heat image, which may be a slightly above room temperature – for example, the radiation resulting from a human hand – is applied through a lens to the input face of transparent container 10. As a result of this application of the heat image, some of the vaporizable film 14 is condensed in the form of the image onto the grooved photoconductor surface of the light amplifier. With a voltage 18 now applied between the light amplifier and the film 14, and with a weak uniform flooding light illumination 20 (as contrasted to heat) applied to the input face of the device, a negative or positive image will appear on the output of the light amplifier depending upon whether the vaporizable material absorbed on the photoconductor decreases or increases its sensitivity. Since the sensitivity of the photoconductor is greatly affected by an adsorbed layer of only a few molecules thickness, this device

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amplifies the effect of evaporating a few molecules off the thin film 14. These few molecules would otherwise be difficult to detect. The device makes possible a bright picture which may last for some time. This is because operation of the light amplifier does not eliminate the adsorbed vaporizable material causing the change in photoconductivity. In order to prepare for another picture, the adsorbed material must be removed by heat, vacuum or other means and the thin film of condensed vapor reformed on the thin plastic support 12.